



U.S. DEPARTMENT OF ENERGY

**Northwest Clean Energy Application Center**

*Promoting CHP, District Energy, and Waste Heat Recovery*

# **Combined Heat & Power: An Introduction**

**David Sjoding**

**Northwest Clean Energy Application Center**

**Energy Education Workshop: Renewable  
Energy Primer & Plugging Wood into the  
Power Grid**

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# **Northwest Clean Energy Application Center**

## **About the Center**

- **A multi-state effort – AK, ID, MT, OR & WA**
  - **WSU Extension Energy Program serves as lead**
  - **100 plus Regional CHP projects totaling over 1,300 MWc**
  - **94% industrial projects**
  - **Technical assistance information, reports and case studies**
  - **Problem solving & trouble shooting**
  - **Website [www.northwestcleanenergy.org](http://www.northwestcleanenergy.org)**
  - **Support of regional & state CHP initiatives**
  - **CHP, district energy and waste heat recovery**

# Changing language

- **Cogeneration – older language often embedded in law**
  - **CHP – Combined Heat and Power with variations like CCHP adds cooling**
  - **CHP – Clean Heat and Power - Recent**
  - **Biopower – Most often but not always CHP**
    - Non CHP examples – Power only facilities**
  - **Renewable CHP**
  - **Biomass to Bioenergy – Shift began about 1990**
  - **Bioenergy CHP – Where sawmills fit**



# **CHP is a natural for local ownership**

- **CHP is local – Right by the load**
- **Supports local industry (forest products, food processing & dairy)**
- **An improved bottom line increases survival**
- **The economic benefits – Reduce your energy costs**
- **Environmental benefits**
- **Improved policy framework needed**

# Typical CHP ownership structures

## Variations include

- Owned by the facility that needs both steam and power – Sierra Pacific, Burlington, WA
- Can have split ownership between steam load need and power production – Grays Harbor Paper
- The local utility can also be an owner – Amalgamated Sugar, Nampa, ID & Idaho Power – Under development at 100 MW
- Project developers



# Power benefits

- CHP is baseload – Not intermittent
- Wood waste CHP is baseload renewable power
- A rare combination – Geothermal is another
- It can take pressure off of transmission & distribution system – Hampton Mill in Darrington, WA
- CHP wheeling to the utility that needs to power
- Full fills renewable electricity standards



# Utilities

## Work with them

- We have a range of attitudes & restrictions
- Varies within a state
- Depends on laws, policy, utility regulations
- A key report: Distributed Generation in Oregon: Overview, Regulatory Barriers and Recommendations

[http://chpcenternw.org/NwChpDocs/DistGenInOregon\\_Overview\\_RegBarriers\\_Reccomendations.pdf](http://chpcenternw.org/NwChpDocs/DistGenInOregon_Overview_RegBarriers_Reccomendations.pdf)

- Standby Rates for Customer-Sited Resources from EPA CHP Partnership
- Need a good Power Purchase Agreement – 10 years plus



# Environmental

- Burning slash piles or to the mill?
- Beyond Waste or to the landfill?
- Output-Based Emissions or Input-Based  
<http://chpcenternw.org/Library.aspx#environment>
- A number of air emissions studies under way



# Needed

## The people side

- **Some fire – A champion**
- **Determination**
- **Street smarts**
- **Build independent technical expertise**
- **A supportive community structure**
- **Forks, WA story – In progress**

**There is no substitute for doing your homework & persistence**



# LOW COST POWER & PROJECT DEVELOPMENT

## The creative solutions of the states are in high gear

- Compare costs to future power plants not existing rates – Integrated Resource Planning, Especially as BPA power is limited
- Buy all – Take all contracts with local utility
- Tax incentives & Grant shopping – Especially USDA Rural Development
- CHP wheeling to utilities in need – Better price
- ARRA stimulus funds (State Energy Program) for equipment
- Renewable Electricity Standards
- CHP can also fit under Electricity Efficiency Standards
- Have a supporting CHP/utility regulatory policy framework
- Selling Renewable Energy Credits/Carbon Credits
- Have utility facilities co-locate with needs for steam
- Co-product development to improve economics



# Moisture

- Major efficiency gains to reduce moisture content of the fuel
- Biomass Drying and Dewatering for Clean Heat and Power

<http://www.chpcenternw.org/NwChpDocs/BiomassDryingAndDewateringForCleanHeatAndPower.pdf>



# Fuel Drying - Why

- **Significantly improves the efficiency of the boiler or gasifier.**
- **For boiler:**
  - **5% to 15% improvements in efficiency**
  - **(Boiler is not an efficient dryer, so dry fuel before boiler.)**
  - **50% to 60% more steam production**
- **Improves combustion**
- **Reduces air emissions**



# Avoiding development mistakes

- **Secure a long-term supply of wood waste/hog fuel**
- **Work with the business arrangements & options of power purchase prices**
- **Ensure a CHP friendly state policy framework**
- **Don't compare prices at the bus bar – Price of delivered power is the starting point**

# Conclusions

- **Economic advantage – Make your own power on-site or sell it/wheel it**
- **Long-term feedstock supply is crucial**
- **Use the feedstock efficiently**
- **BIOMASS CHP – A WINNER!**

